DOCUMENT RESUME

ED 075 379 SP 006 340

TITLE	University of South Florida Field Test of the Michigan State University Protocol Materials on Learning. Final Report.
INSTITUTION	University of South Florida, Tampa. Coll. of Education.
SPONS AGENCY	Florida State Dept. of Education, Tallahassee.
PUB DATE	Jan 73
NOTE	35p.
EDRS PRICE	MF-$0.65 HC-$3.29
DESCRIPTORS	Audio Visual Instruction; *Educational Research; *Instructional Materials; *Learning Activities; *Protocol Materials; *Teacher Education

ABSTRACT

The Michigan State University protocol materials on learning were field-tested at the University of South Florida (U.S.F.). The field-testing at U.S.F. did not occur under controlled, experimental conditions. The information needs of the protocol developers were balanced with the instructional obligations of the instructors and the educational needs of the students in the classes. Instructional management problems and error sources were highlighted. Error sources included operant learning, positive reinforcement, negative reinforcement, shaping, respondent learning, and model learning. (Appendixes of field-test material are included.) (MJM)

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ED 075379

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University of South Florida Field Test of The Michigan State University Protocol Materials on Learning

Grant Number S.D.E. 720-050

Final Report

January, 1973

By

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SP 006 340

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Objectives

The Michigan State University (M.S.U.) protocol materials on learning were field tested at the University of South Florida (U.S.F.) with financial support from the State of Florida Protocols Project. Field testing the M.S.U. protocol materials was undertaken at U.S.F. to obtain data related to several major concerns:

1. What problems occur in the management of instruction when a protocols package is incorporated in an established course?

2. What are the success rates of students at different institutions which use the same protocol materials? Success rate refers simply to the percent or proportion of students achieving a pre-specified level of accuracy on the criterion tests.

3. What aspects of the protocol package seem to be sources of confusion and error in student mastery of the concepts?

4. What are the instructional outcomes which seem to be unexpected consequences of using protocol materials?

Procedure

Almost a year before the field testing was conducted at USF, Professors Judy Henderson, Joe Byers, and Bruce Burke of MSU met with several members of the USF educational psychology department to discuss the development of their protocol materials on human learning. Following that introduction and before introducing the protocol materials in the classes at USF, Professors Dickinson and Wong visited MSU to observe the instructional practices used in the beginning educational psychology course and to discuss their protocol development staff's needs for data of certain types coming from field testing.

Acquisition of the protocol materials, recruitment of USF

educational psychology faculty to participate, and the orientation of the volunteer faculty began in the fall (Quarter I) of 1971. Each faculty participant received a complete set of protocol materials well in advance of the time that the materials were to be introduced in his or her class. The protocol films were previewed and discussed. A subsequent visit by Professor Burke provided the faculty another opportunity to raise questions and receive the benefit of the MSU experience.

Duplication and assembly of the printed materials, a costly and awkward process under the USF conditions, were completed early in Quarter II. Dissemination of the instructional materials was handled by each instructor according to his or her judgement of the most suitable procedure. In most instances, instructors handed out the appropriate materials in the meeting prior to the class meeting when the particular concept would be studied. In one instance students received all the printed materials at one time along with a calendar showing concept testing dates and concept film projection dates and times.

Before distributing the materials in class, students were told that they would be using instructional materials which were being developed to facilitate the learning of key concepts in human learning. It was emphasized that the final form of the instructional materials--both printed and filmed--would be determined in part by the types of experiences the students had using them. The instructors then answered only questions regarding the materials and the procedures. The students' protocol performances were included in every case in the computation of the students' final grades for the course.

In all but two instances, the protocol materials were used as part of the in-class activity. Students read the pre-film materials before coming to class, and in class they viewed the films and worked through the film guide. The instructor answered questions, noted sources of confusion, made judgments about the authors' intended meanings and generally acted to help individual students as they experienced difficulties. Small group discussions frequently occurred, but were not designed by the instructor as part of the procedure. At the end o the class period students took the concept mastery test.

In the two exceptional instances, instructors designed their courses so that students devoted more time to out-of-class study and projects. The protocol films were telecast on closed-circuit to the USF Learning Center where students could view the films in private carrels as many times as the broadcast time permitted. The telecast schedules and the out-of-class testing arrangements were provided to the students with the printed protocol materials.

In every case instructors added the protocol package to their regular instructional routine without deleting other instructional objectives. Without exception, therefore, the learning load on students was heightened by the use of the protocol materials.

The field-testing conducted at USF clearly did not occur under controlled, experimental conditions. The director of the USF field test sought to balance the information needs of the protocol developers with the instructional obligations of the instructors and the educational needs of the students in the classes. The data are, therefore, sometimes quite ambiguous and perhaps, never more than merely

suggestive of answers to the major concerns as they apply to the USF experience.

Instructional Management Problems

Apart from the printing and assembling problems in preparing the protocol materials for use at USF, the distribution, the subsequent collection and storage of the materials for later re-use posed obvious logistical problems not ordinarily found in college classroom management. These problems seem to be unique to the activity of field-testing and are reported, not as limitations of protocol materials, but as a managerial problem in field testing.

One major source of difficulty which plagued all instructors was the film projection. Machine failures, operator errors, soundtrack problems, film breakage, and damage to projectors occurred during the field test. The short supply of trained film projectionists from USF's Instructional Services forced the participating instructors to show the films themselves. Much of the difficulty experienced seemed to be the result of operator ignorance and the reliability of the equipment.

A second major source of difficulty was the problem of test security. With multiple class sections using the protocol materials and with their use in consecutive academic terms, the possibility of losing test security seemed real. At the same time, students wanted feedback about their performance which meant review of questions and answers. The policy was to let individual students examine their tests, challenge the answer key and then sufficiently question them to teach the concept attribute on which the error was made. Students were not allowed to use paper and pencils when reviewing the materials.

A third major management problem arose in using the final protocol examination. Student performance was surprisingly bad--less than 20 percent achieved 80 percent accuracy--and in light of their relative success on the individual concept test, the students' results were enormously disappointing to them and to their instructors. Class morale in each instance was so severely shaken that all of the instructors quit using the final examination. Those instructors who wanted a final examination over the protocols used the pre-test form.

A less serious management problem occurred often enough that it warrants mentioning. When for example, students disagreed with the answers to the case-study questions in the film guides and their instructors also judged the guide's answer in error, it produced among some students a skepticism about the concepts, the materials and the objectives of the protocol unit. On the other hand, many students could accept the idea that disagreements occur between or among professionals without using the disagreements as a basis for dismissing the materials as a useful source of important information.

Instructors reported that many (at times about 75% of a class) students in their haste to get to the test-like examples at the end of the film guide failed to read carefully the pre-film units and the film guide's explanatory materials. The behavior of students seemed to be oriented toward the successful completion of the concept tests and, therefore, they seemed to prefer spending their time on test-like questions even when their mastery of the concept's attributes fell short of the requisite competence level.

Error Sources

The criterion tests for the six concepts were of the short-answer, essay variety. Test scoring reliability seems to have been a bit of a problem, at least when instructors compared notes on their scoring of selected items. Efforts were made to reduce between-teacher variability in scoring, but no quantitative data were obtained to demonstrate the effect.

The criterion test construction warrants passing comment. Efforts were needed to balance the scoring weights for the several parts of a given question. For example, identifying the item as representative or non-representative of the concept was worth one point. By showing which attributes were present to make the item a representative of the concept students could earn the number of points equal to the number of attributes. However, a non-example always yielded points in the amount of the number of missing attributes. In almost every case non-examples were characterized by one missing attribute and therefore were worth one point.

Before examining the separate concepts to locate sources of disproportionate error, it is useful to note that the variation in the percent of students achieving the 80 percent accuracy criterion on the six concept was not apparently a strong function of the number of attributes in the concept. As shown in Table I, the lowest percent achieving the prescribed performance criterion level was in Operant Learning, a concept with four attributes while the highest was in Model Learning with five attributes. The mean accuracy rate of the two three-attribute concepts (Shaping and Negative Reinforcement) was 73 percent, for the two four-attribute concepts (Positive Reinforcement and Operant Learning), 59 percent;

and for the two five-attribute concepts, (Respondent Learning and Model Learning), 66.2 percent.

The variation in concept difficulty as reflected in the percent of all errors occurring on a given concept test is shown in Table II. Again, the relationship between number of attributes and the percent of errors seemed to be a positive one. The average percent of all errors occurring on the three-attribute concepts was 7.8; on the four attribute concepts, 18.7; on the five attribute concepts, 23.5%.

Concept difficulty is partly determined by the number of attributes, but the different error rates could as well be a function of the greater number of responses demanded on the criterion tests for the more complex concepts. Until the criterion tests are balanced so that the number of responses are held constant across the concepts, no firm conclusion can be reached about the sources of variation in error rate.

Finally, there appeared to be a learning-how-to-learn phenomenon associated with performance on the protocol concepts. The low achievement rate in the Operant Learning concept, the first one in the protocol package, seemed to be a function of its newness to the students as an instructional procedure. After the Operant Learning concept in all of the class sections, student performance was substantially better on the remaining concepts with the possible exception of the Respondent Learning concept.

Operant Learning (OL) As shown in TableIII, almost forty percent of the errors on the OL criterion test were made on the Temporal Relationship attribute. The remaining errors were distributed about equally among the other three attributes. Examination of the written text

explicating Temporal Relationship shows that the emphasis is on the immediate appearance of a consequence following the behavior. The labeling of the attribute may be a source of confusion simply because it is a general rather than specific one. Temporal relationships exist between or among any two or more events, and there is nothing about the expression to suggest casual connection, only relative positions in the passage of time.

The concept might have produced fewer errors had the two attributes--Consequences and Temporal Relationships--been combined to produce the following attribute: immediate consequence. On page 30, bottom paragraph, consequence is defined as "... any event that immediately follows a behavior." If consequence implies immediate outcome, the Temporal Relationship is a superfluous attribute.

The attribute of Behavior Change required supplemental discussion in class because many students had not conceptualized behavior as response frequency. In this case, the absence of prerequisite entering behavior delayed the acquisition of the concept even when presented in the protocol format.

O.L. Film. As shown in Table IV, film details as judged by students were of average or satisfactory quality. Sound quality was below expectations as words were garbled and background noise was distracting to listeners. According to student respondents the film content was quite well integrated with the written materials.

On page 44 of the OL film guide, the teacher is described as having "rewarded those who had lined up appropriately." In fact, the teacher in the film rewarded those students who said they had

behaved appropriately and did not reward the student who said he had not behaved in line. In effect, the teacher was reinforcing verbal expressions of compliance.

Positive Reinforcement (PR) Data reported in Table V show that more than sixty percent of the errors on the PR test occurred on two attributes--Contingency and Temporal Relationship. The notion of contingency is presented on page 58 as "The rewarding of stimulus must be a direct consequence of the behavior that was emitted--i.e., the rewarding stimulus is withheld unless the behavior is emitted." The preposition of at the beginning was a nuisance source of confusion, repeated throughout the chapter. More important, from the field test facultys' viewpoint, was the absence of the word dependent. A contingent event is an event dependent upon an antecedent occurrence.

Field test faculty and students also were confused by the absence of the Behavior Change attribute which was present in the O.L. concept presentation. Technically, positive reinforcement can only be inferred from a set of conditions (events) which include a behavior, subsequent presentation of a stimulus event, and then an increase in the behavior's frequency of occurrence. While the absent attribute could not be shown directly as a source of difficulty, it presented a departure from the explicit and complete model of behavior change presented in the O.L. chapter and as an inconsistency was a source of logical difficulty in the PR section. This particular difficulty can also be described as a definitional problem. In the O.L. discussion, a functional definition was used; in the PR, a procedural definition. On this point the field-test faculty strongly emphasized the desirability of teachers relying on the functional definition while pointing out the problems which follow from using procedural definitions.

P.R.Film. Student reaction to the PR film reported in Table VI was that the visual representation was reasonably good, that the sound was audible and clear and that the film was well integrated with the written materials. The field-test staff was satisfied with the film as a representation of positive reinforcement.

Negative Reinforcement (NR) The data in Table VII reveal that almost half of the errors were made on the Behavior attribute. The NR materials, from the field-test staff's viewpoint, led to confusion about the meaning of behavior because it is constantly implied throughout the three attributes. Presence of Discomfort, for example, is inferred from behavior--writing furiously, asking questions, yawning, fidgeting, complaining. Equally confusing to the staff was the Escape from Pain in which physical avoidance or escape from a situation could be observed, but required an additional statement specifying the reduction of discomfort. Finally, no Increase in Behavior attribute was required to show that removal of the aversice stimulus was actually reinforcing.

While the overall student achievement level was about as high as on any concept in the protocol unit, the limitations in the NR concept's definition seemed to be sufficiently serious that one might conclude no adequate mastery of the concept was possible under the conditions.

N.R. Film. Table VIII shows that students gave a mixed report on the visual quality and organization of the film with one-third rating it below the middle scale value and 35 percent above the midpoint. Sound quality was judged to be below average and was a source of confusion. Integration of the film with written materials was judged to be reasonably good.

Field-test staff were in disagreement among themselves about the filmed portrayal of negative reinforcement. Principally the question was whether avoidance of an aversive stimulus was the reinforcer or whether, in the case of the student who wants to go to the office, there is the presence of a positive reinforcer. The argument was a peripheral concern and only represents the dilemma posed by the notion of negative reinforcement.

Shaping (SH) Students completing the criterion test on SH tended to make more errors on the successive approximation attribute than on either of the other two as shown in Table IX. Although the incidence of error on this concept was equal to the lowest found among the six concepts, there occurred some confusion between the attributes of Successive Approximation and Selective Reinforcement. Part of the confusion stems from the inconsistency in the text on page 107. The initial specification of attributes identifies Reinforcement, "Some form of rewarding consequence...," and Successive Approximations,"Reinforcement is given selectively as the behavior becomes more like...terminal behavior." On page 108 the labels read: Selective Reinforcement and Successive Approximations and later in the text, (p.117) the labels are changed again to Reinforcement and Successive Approximations with Differential Reinforcement in parentheses. Errors made on the Selective Reinforcement attribute were, more often than not, due to the respondent's omitting the word Selective.

The definition of Shaping presented in the text seemed to be more compatible with the field test staff's notion of a functional definition. With a lower error rate and apparent definitional

adequacy, the field-test staff expressed greater comfort with the use of this particular concept unit.

SH. Film. Film quality as viewed by students (Table X) was adequate with more students reporting favorable reactions than unfavorable. Sound quality was poor to fair according to the students, but overall integration of the film with written text was judged adequate. The field test staff also reported relative difficulty with sound quality, but concluded that the film was an adequate representation of shaping.

Respondent Learning (RL) The RL concept unit was clearly among the most difficult for students. Slightly more than half of the students achieved the 80 percent accuracy level, and more than one-third of all student errors on the entire protocol package occurred on the RL unit. As shown in Table XI, 40 percent of the errors occurred on the CR attribute with the remaining four attributes roughly equal sources of error.

Some confusion in the meaning of UCS arose because students believe that UCS had to be a natural or unlearned event which elicited a UCR. UCS was also presented as an "inner state," not one easily observed, e.g. p.130, UCS...Hunger. It might have been better to describe the setting such as "absence of food for X hours."

CR's specification posed a problem similar to UCS. The so-called emotional or affective response was specified as the CR, but in most cases the feeling had to be inferred from the overt behavior. Students seemed able to specify the overt behavior, but failed to grasp the need to make the additional inference of feeling.

Analyses of the written errors suggest to the field test staff that the prior, more limited definition of respondent conditioning taught in introductory psychology classes interfered with acquisition of the UCS attribute. An additional source of confusion seemed to come from the UCR and CR attributes which were defined as feeling states inferred from behaviors which themselves were often operant behaviors. Students developed operant strategies to produce the operant behaviors from which the respondent consequences could be inferred.

On page 137, the lists of USC's constitute as well arrays of reinforcing stimuli. Such lists added to the confusion--interference--between the operant and respondent learning concepts. In order to clarify the confusion the field-test staff almost always supplemented the text with, a "lecturette" on the affective consequences of operant procedures, making the point that operant procedures always can be shown to have respondent learning attributes present. The distinction between operant and respondent learning is largely a matter of procedural differences in sequencing stimuli.

R.L.Film. Judged by all sources of feedback, the RL film was the aesthethic hit of the protocol package. Spontaneous applause occurred in every class with smiles and happy reactions among the students commonplace. Table XII reveals that student reaction to visual details of the film was positive, ranking second in level of rating among the six concept films. Sound quality was judged to be good as was the integration of the film with the written text. Field-test staff reported satisfaction with the film and had no suggestions for its revision.

Model Learning (ML) With roughly only ten percent of all errors occurring on the unit and almost 80 percent of the student's achieving criterion accuracy level, this unit was the most successful of the six concept units. The two attributes most troublesome to students were Credible Model and Consequences to Model with two-thirds of all the errors made on this unit. Distribution of errors across attributes is shown in Table XIII. The field-test staff's reaction to the unit was uniformly favorable. Student confusion seemed to be at a minimum and staff generally did not have to "defend" any examples or interpretations.

M.L. Film. Student reaction to the ML film was as positive as it was for the RL film. Data in Table XIV show that more than 60 percent of the students judged the visual qualities to be good or very good. Audio characteristics received varying judgments with 23 percent registering disapproval while 43 percent approved of the sound quality. Integration of the film with the written text was favorably received.

Unexpected Consequences of Using Protocol Materials

Several things happened to the USF field-test faculty as a result of their participating in the MSU protocol field test. First, there developed a heightened awareness of the need to identify the key concepts in educational psychology and to structure more adequately the learning experience by using the procedures incorporated in the MSU protocols. The USF field testers, in their own classes, began to introduce more case examples and non-examples to explicate the meaning of selected concepts.

A second outcome was to increase the opportunities for student-paced and out-of-class instruction with a concurrent reduction in the lecture as the main instructional procedure. This seemed to be happening before the field test, but the process appeared to be accelerated as a consequence of the protocol procedure.

For some the protocol emphasized concepts which were not normally included in the beginning educational psychology course. For example, model learning was not emphasized in any of the classes prior to the use of the protocols, but following the conclusion of the field test, model learning was included in the course content by all the field testers.

Instructional cost, a talked-about concept, was brought to life by the use of protocol materials. The man-hours involved in evaluation and feedback rapidly exceeded any other procedure employed by the field-test faculty. The development of special materials, the need for several kinds of instructional space for the same class, the need for technical assistance in media management, and the cost of evaluation of learning were amply illustrated in the experiences of

the faculty. In a sense, the participation in the field test increased the sophistication of the participants.

While not totally unexpected, students came to expect the same level of organization and relevance in the remainder of the course. There was additional payoff in students reporting that they "saw a concept" in a classroom visit or pre-internship experience just like the one described in the film or in the guide. Such feedback came as late as two quarters after the student was in the class.

Finally, for some participating USF faculty, the contact with the MSU approach to educational psychology was a stimulating and provocative challenge to assumptions held locally. In the broadest sense, it was an educational experience for the USF faculty.

APPENDIX

FIGURE 1

Note this form differs in some ways from the Michigan State University form.

STUDENT ANALYSIS FORM

Protocol Materials for Teacher Education

Concept Unit Evaluation

Instructions:

This form has been designed to collect your judgment of the instructional value of the concept unit you have just finished. Please read each item carefully and be as objective as possible in reaching your decision.

The five numbers following each question represent a scale or continuum. The extremes of each scale have been identified to aid your making this choice. Mark on your answer sheet the number which best represents your judgment of the degree to which the concept unit satisfied each criterion identified in the question. A concept unit includes both the film(s) and the printed materials.

PLEASE DO NOT OMIT ANY ITEMS--RATE THE CONCEPT UNIT ON EACH CHARACTERISTIC.

1. How clear to you were the objectives of the concept unit?
   Ambiguous ... Clear
   1 2 3 4 5

2. How interested were you in the concept unit which you have just finished?
   Bored Stiff ... Very Interested
   1 2 3 4 5

3. To what extent did the concept unit build on your previous knowledge, skills, or experiences?
   No relationship ... Highly Related
   1 2 3 4 5

4. Was the learning outcome in this concept unit appropriate for your present understanding of teaching and learning?
   Not appropriate ... Very Appropriate
   1 2 3 4 5

5. Did the content support your achievement of the instructional objectives of the concept unit?
   No Support ... Clearly Supported
   1 2 3 4 5

6. Was the content of the film guide presented in a well organized and systematic way?
   Confused, Disorganized ... Very Well Organized
   1 2 3 4 5

7. Were the important ideas and concept attributes clearly emphasized?
   Not At All ... Very Clear
   1 2 3 4 5

8. Did the concept unit attempt to present too much material to be learned at one time?

Very Definitely Too Much				Entirely Appropriate Amount
1	2	3	4	5

9. Were new facts, ideas, terminology or procedures introduced at a rate which permitted you to learn them?

Too Fast				Too Slow
1	2	3	4	5

10. Did the concept unit provide for adequate repetition of the important content? (e.g., repetition with variation, exact repetition, summaries, outlines.)

Very Inadequate				Excellent
1	2	3	4	5

11. Were the methods of presentation (motion picture, printed materials, discussion) suitable for the subject matter?

Very Inappropriate				Most Appropriate
1	2	3	4	5

12. Were the visual details of the filmed segments clearly presented? (This refers to camera angles, lighting, sharpness, exposure, use of closeups, etc.)

Very Poor Film				Very Good
1	2	3	4	5

13. Was the difficulty of the tasks in the concept unit appropriate for your level of educational development?

Too Difficult				Too Easy
1	2	3	4	5

14. Was the sound track clearly audible?

Inaudible				Very Easily Heard
1	2	3	4	5

15. Was the verbal difficulty of the materials appropriate for you?

Too Difficult				Too Easy
1	2	3	4	5

16. Were the written materials easy to use and to understand?

Impossible To Use, Understand				Very Easy To Use, Understand
1	2	3	4	5

17. Was the information in the written materials well integrated with that presented in the motion picture film?

No Integration				Closely Integrated
1	2	3	4	5

TABLE I

NUMBER OF ERRORS ON EACH CONCEPT TEST EXPRESSED AS PERCENT OF TOTAL ERRORS MADE ON THE SIX CONCEPT TESTS

CONCEPT	ERRORS	PERCENT OF ALL ERRORS
Operant Learning	406	24.9
Positive Reinforcement	203	12.5
Negative Reinforcement	128	07.8
Shaping	128	07.8
Respondent Learning	605	37.2
Model Learning	158	09.7
Totals	1628	99.9

TABLE II

NUMBER, PERCENT OF ALL STUDENTS ACHIEVING EIGHTY PERCENT ACCURACY ON CONCEPT CRITERION TESTS

CONCEPT	TOTAL N	N ACHIEVING CRITERION	PERCENT AT CRITERION
Operant Learning	244	114	46.7
Positive Reinforcement	244	174	71.3
Negative Reinforcement	244	173	70.9
Shaping	244	183	75.0
Respondent Learning	244	132	54.1
Model Learning	244	191	78.3

TABLE III

NUMBER, PERCENT OF ATTRIBUTE ERRORS ON OPERANT LEARNING CRITERION TEST

ITEM		ATTRIBUTES							
		Behavior		Consequences		Temporal Relationship		Behavior Change	
		N	P	N	P	N	P	N	P
I	2	8		10		32		6	
	6	4		20		30		7	
	8	3		9		30		16	
		15	3.7	39	9.6	92	22.7	29	7.2
II		57	14.0	56	13.8	70	17.2	48	11.8
TOTALS		72	17.7	95	23.4	162	39.9	77	19.0

TABLE IV

STUDENT EVALUATION OF OPERANT CONDITIONING UNIT

ITEM NUMBER	RESP. 1		RESP. 2		RESP. 3		RESP. 4		RESP. 5		TOTAL	MEAN
	N	P	N	P	N	P	N	P	N	P	N	
1	0	00	2	02	33	28	35	30	48	41	118	4.1
2	2	02	10	08	44	37	38	32	35	29	119	3.8
3	5	04	14	12	36	30	44	37	21	18	120	3.5
4	3	02	5	04	26	22	44	37	40	34	118	3.9
5	0	00	9	08	30	25	52	44	27	23	118	3.7
6	2	02	7	06	36	30	41	34	34	28	120	3.8
7	1	01	9	08	19	16	47	39	43	36	119	4.0
8	6	05	10	08	28	24	53	44	22	18	119	3.6
9	6	05	19	16	71	61	18	16	2	02	116	2.9
10	6	05	5	04	24	20	53	45	29	25	117	3.8
11	3	02	7	06	28	24	48	40	33	28	119	3.8
12	18	15	22	19	47	40	24	20	7	06	118	3.2
13	0	00	5	04	83	72	24	21	4	03	116	3.2
14	33	02	46	39	22	19	10	08	7	06	118	2.3
15	0	00	7	06	84	71	27	23	0	00	118	3.2
16	0	00	7	06	28	24	54	46	28	24	117	3.9
17	0	00	8	07	23	20	48	41	38	32	117	3.8

TABLE V

NUMBER, PERCENT OF ATTRIBUTE ERRORS ON POSITIVE REINFORCEMENT CRITERION TEST

ITEM		ATTRIBUTES							
		Behavior		Consequences		Contingency		Temporal Relationship	
		N	P	N	P	N	P	N	P
I	3	4		0		4		9	
	5	7		6		15		14	
	9	5		2		20		6	
		16	7.9	8	3.9	39	19.2	29	14.3
II		23	11.3	28	13.8	29	14.3	31	15.3
TOTALS		39	19.2	36	17.7	68	33.5	60	29.6

TABLE VI

STUDENT EVALUATION OF POSITIVE REINFORCEMENT UNIT

ITEM NUMBER	RESP. 1		RESP. 2		RESP. 3		RESP. 4		RESP. 5		TOTAL	MEAN
	N	P	N	P	N	P	N	P	N	P	N	
1	2	02	3	03	18	16	35	32	51	47	109	4.2
2	2	02	13	12	31	28	41	38	22	20	109	3.6
3	2	02	6	05	34	31	44	40	23	21	109	3.7
4	4	04	2	02	27	25	38	35	38	35	109	3.9
5	2	02	3	03	31	28	51	47	22	20	109	3.8
6	3	03	9	08	13	12	45	41	39	36	109	4.0
7	1	01	1	01	24	22	42	38	41	38	109	4.1
8	5	04	7	06	34	31	43	39	20	18	109	3.6
9	4	04	21	19	70	58	12	11	2	02	109	2.9
10	2	02	6	05	25	23	49	45	27	25	109	3.8
11	2	02	5	04	30	28	38	35	33	30	108	3.9
12	10	09	21	19	32	30	32	30	13	12	108	3.1
13	1	01	6	05	76	70	24	22	2	02	109	3.2
14	7	06	31	29	28	26	28	26	14	13	108	3.1
15	0	00	4	04	72	67	29	27	0	00	108	3.2
16	0	00	3	03	25	23	47	44	32	30	107	4.0
17	0	00	7	06	25	23	39	36	38	35	109	4.0

TABLE VII

NUMBER, PERCENT OF ATTRIBUTE ERRORS ON NEGATIVE REINFORCEMENT CRITERION TEST

ITEM		ATTRIBUTES					
		Presence of Pain		Behavior		Escape	
		N	P	N	P	N	P
I	2	1		18		2	
	6	2		0		1	
	8	4		27		3	
		7	5.5	45	35.1	6	4.7
II		25	19.5	18	14.1	27	21.1
TOTALS		32	25.0	63	49.2	33	25.8

TABLE VIII

STUDENT EVALUATION OF NEGATIVE REINFORCEMENT UNIT

ITEM NUMBER	RESP. 1		RESP. 2		RESP. 3		RESP. 4		RESP. 5		TOTAL	MEAN
	N	P	N	P	N	P	N	P	N	P	N	
1	2	02	9	08	32	28	29	26	40	36	112	3.8
2	2	02	13	12	44	39	39	35	14	12	112	3.4
3	6	05	13	12	42	37	36	32	16	14	113	3.4
4	3	03	11	10	39	34	30	26	30	26	113	3.6
5	0	00	9	08	37	33	42	37	25	22	113	3.7
6	3	03	14	12	29	26	42	37	25	22	113	3.6
7	2	02	17	15	25	22	48	42	21	18	113	3.6
8	2	02	15	13	40	35	37	33	19	17	113	3.5
9	7	06	24	21	65	58	13	12	3	03	112	2.9
10	7	06	12	11	29	26	50	45	14	12	112	3.5
11	2	02	12	11	33	30	44	40	20	18	111	3.6
12	14	12	24	21	33	29	27	24	14	12	112	3.0
13	2	02	7	06	78	70	22	20	0	00	112	3.1
14	15	13	37	33	41	37	14	12	5	04	112	2.7
15	0	00	7	06	79	70	22	20	4	04	112	3.2
16	0	00	13	12	39	35	37	33	23	20	112	3.6
17	1	01	9	08	36	32	38	34	27	24	111	3.7

TABLE IX

NUMBER, PERCENT OF ATTRIBUTE ERRORS ON SHAPING CRITERION TEST

ITEM	ATTRIBUTES					
	Initial Behavior		Successive Approximation		Selective Reinforcement	
	N	P	N	P	N	P
I 2	0		19		3	
5	3		2		1	
9	11		25		28	
	14	10.9	46	36.0	32	25.0
II	17	13.3	10	7.8	9	7.0
TOTALS	31	24.2	56	43.8	41	32.0

TABLE X

STUDENT EVALUATION OF SHAPING UNIT

ITEM NUMBER	RESP. 1		RESP. 2		RESP. 3		RESP. 4		RESP. 5		TOTAL	MEAN
	N	P	N	P	N	P	N	P	N	P	N	
1	1	01	10	10	17	17	39	38	35	34	102	3.9
2	4	04	9	09	34	33	33	32	22	22	102	3.6
3	1	01	12	12	27	26	45	44	18	17	103	3.6
4	1	01	6	06	24	23	49	48	23	22	103	3.8
5	2	02	10	10	27	26	46	45	18	17	103	3.7
6	1	01	10	10	26	25	38	37	28	27	103	3.8
7	1	01	7	07	30	29	37	36	28	27	103	3.8
8	2	02	6	06	34	33	38	37	23	22	103	3.7
9	2	02	13	13	72	71	11	11	3	03	101	3.0
10	2	02	14	14	24	24	44	43	18	18	102	3.6
11	3	03	9	09	28	27	34	33	28	27	102	3.8
12	7	07	18	18	36	36	23	23	17	17	101	3.2
13	1	01	4	04	67	66	25	24	5	05	102	3.3
14	7	07	34	34	31	31	18	18	11	11	101	2.9
15	0	00	9	09	63	62	26	26	3	03	101	3.2
16	0	00	5	05	32	32	40	40	24	24	101	3.8
17	2	02	1	01	29	29	43	43	24	24	99	3.8

TABLE XI

NUMBER, PERCENT OF ATTRIBUTE ERRORS ON RESPONDENT LEARNING CRITERION TEST

ITEM		ATTRIBUTES									
		Unconditioned Stimulus		Unconditioned Response		Conditioned Stimulus		Pairing		Conditioned Response	
		N	P	N	P	N	P	N	P	N	P
I	3	20		16		38		33		37	
	5	7		5		17		18		87	
	8	39		38		22		12		76	
		66	10.9	59	09.7	77	12.7	63	10.4	200	33.1
II		23	03.8	29	04.8	29	04.8	19	03.1	40	06.6
TOTALS		89	14.7	88	14.5	106	17.5	82	13.5	240	39.7

TABLE XII

STUDENT EVALUATION OF RESPONDENT LEARNING UNIT

ITEM NUMBER	RESP. 1		RESP. 2		RESP. 3		RESP. 4		RESP. 5		TOTAL	MEAN
	N	P	N	P	N	P	N	P	N	P	N	
1	2	02	9	09	26	25	32	31	33	32	102	3.8
2	4	04	11	11	33	32	36	35	19	18	103	3.5
3	5	05	11	11	33	32	37	36	17	16	103	3.5
4	4	04	7	07	30	29	44	43	18	17	103	3.6
5	2	02	9	09	40	39	35	34	17	16	103	3.5
6	0	00	5	05	29	28	31	30	37	36	102	4.0
7	4	04	11	11	27	26	33	32	27	26	102	3.7
8	12		9	09	40	39	27	26	14	14	102	3.2
9	7	07	22	22	57	56	13	13	3	03	102	2.8
10	2	02	16	16	31	30	42	41	12	12	103	3.4
11	1	01	7	07	31	30	39	38	25	24	103	3.8
12	4	04	10	10	37	36	21	21	30	29	102	3.6
13	3	03	9	09	66	64	22	21	3	03	103	3.1
14	6	06	13	13	34	33	23	22	26	25	102	3.5
15	2	02	5	05	68	67	25	25	1	01	101	3.2
16	2	02	15	15	40	39	28	27	17	17	102	3.4
17	0	00	9	09	27	27	38	38	27	27	101	3.8

TABLE XIII

NUMBER, PERCENT OF ATTRIBUTE ERRORS ON MODEL LEARNING CRITERION TEST

ITEM		ATTRIBUTES									
		CREDIBLE MODEL		CONSEQUENCES TO MODEL		OBSERVATION MODEL		MODEL'S BEHAVIOR		OBSERVER's BEHAVIOR	
		N	P	N	P	N	P	N	P	N	P
I	3	1		13		1		1		2	
	5	2		4		1		1		2	
	8	5		21		6		15		4	
		8	5.1	38	24.1	8	5.1	17	10.8	8	5.0
II		44	27.8	16	10.1	7	4.4	7	4.4	5	3.2
TOTALS		52	32.9	54	34.2	15	9.5	24	15.2	13	8.2

TABLE XIV

STUDENT EVALUATION OF MODEL LEARNING UNIT

ITEM NUMBER	RESP. 1		RESP. 2		RESP. 3		RESP. 4		RESP. 5		TOTAL	MEAN
1	1	01	3	03	21	20	38	37	40	39	103	4.1
2	3	03	6	06	25	24	48	47	20	20	102	3.7
3	1	01	10	10	37	36	41	40	14	14	103	3.6
4	2	02	7	07	29	28	37	36	28	27	103	3.8
5	1	01	0	00	31	30	44	43	27	26	103	3.9
6	2	02	6	06	15	14	39	38	41	40	103	4.1
7	1	01	10	10	22	21	39	38	31	30	103	3.7
8	3	03	5	05	33	32	35	34	27	26	103	3.8
9	6	06	10	10	68	66	16	16	3	03	103	3.0
10	1	01	6	06	26	25	51	50	19	18	103	3.8
11	3	03	6	06	15	14	45	44	34	33	103	4.0
12	6	06	9	09	24	23	32	31	32	31	103	3.7
13	1	01	4	04	60	58	31	30	7	07	103	3.4
14	6	06	18	17	34	33	20	19	25	24	103	3.4
15	0	00	6	06	62	60	29	28	6	06	103	3.3
16	1	01	5	05	31	30	35	34	30	29	102	3.8
17	3	03	6	06	23	23	34	34	35	35	99	3.7